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Remarks

Claims 1-20 are pending in the present application. Claims 1-3, 6-8, and 10-11 have been rejected. Claims 4, 5, 9, and 12-20 have been withdrawn.

In view of the arguments/remarks set forth below, Applicant respectfully requests reconsideration of the present application.

Applicant's Response to Rejection of Claims Under 35 U.S.C. §103

Claims 1-3, 6-8, and 10-11 have been rejected under 35 U.S.C. §103(a) as unpatentable over Japanese patent 11-158733 to Aranaga et al. ("Aranaga") in view of U.S. Patent No. 4,038,452 to Kobayashi et al. ("Kobayashi.") These rejections are respectfully traversed on the grounds that the Examiner has failed to establish a *prima facie* case of obviousness.

The present invention provides a non-woven fabric including bicomponent fibers oriented in a well-defined plane, where the fabric has a bulk density of 0.2-0.4 g/cm^3. This fabric has the advantages of a higher toughness and higher stretch recovery that have not been previously realized in the art.

As was stated in the response filed July 17, 2003, the combination of Aranaga with Kobayashi fails to teach or suggest every element of the present claims. Specifically, neither Aranaga nor Kobayashi discloses, teaches or suggests (1) a polyester bicomponent fabric having a bulk density of 0.2-0.4g/cm^3 or (2) a fabric wherein the fibers are oriented in a well-defined plane.

The Applicant pointed out in the previous response that the apparent density of Kobayashi, 0.05 to 0.25g/cm^3, cannot be directly compared to that of the present invention because Kobayashi uses acrylonitrile polymer fibers while the present invention claims polyester bicomponent fibers. The Examiner has responded by stating that it would have been obvious to look to Kobayashi to show "conventional nonwoven fabric bulk density." However, Applicant maintains that since the bulk density of the fabric is a property depending on the density of the polymer, the density of a polyester fabric cannot be directly compared to the density of an acrylonitrile containing fabric. Furthermore, given the significantly different densities of these polymers, one of skill would not look to teachings of acrylonitrile fabrics to prepare polyester fabrics.

The Examiner asserts at page 5, third paragraph of the action dated October 13, 2006 that, "the density referred to by Kobayashi...is the density of the fabric, not the density of the fibers of the fabric." However, the Examiner has ignored the fact it is the polymer alone that gives the fabric its density and that the fabric and the polymer contained therein, are not mutually exclusive. The density of two different polymer containing fabrics are no more interchangeable than the densities of the polymers themselves, since it is the density of the polymer that primarily provides the density of the fabric. The reason is that a fabric arguably contains only two components, polymer fiber and air. Since the density of air is neglible in comparison, the density of the fabric is determined by density of the polymer fiber.

For example, given an equal volume of two different substances having different densities, the substance with the higher densitiy will be heavier (i.e., have more mass). Therefore, in order to achieve a fabric of the same density for a given volume, one would need to add a larger amount (a greater volumne) of the substance having the smaller density in comparision to the substance having the greater density to achieve two separate fabrics having the same bulk density. In other words, the polyetster fabric has more space and less polymer than an acrylonitrile fabric having the same bulk density because the density of polyester is significantly greater than the density of acrylonitrile. This point is emphasized below:

Density (ρ) is obtained by the following formula (I):

(I) $\rho = m/V$, where m is mass and V is volume, therefore:

(II) $\rho_{fabric} = m_{fabric}/V_{fabric}$, and

(III) $m_{fabric} = m_{polymer} + m_{air}$.

However, since the mass of air is negligible, we assume that:

(IV) $m_{fabric} = m_{polymer}$,

and since $m = \rho V$, from (I) we substitute for the mass in (IV) to obtain

(V) $\rho_{fabric}V_{fabric} = \rho_{polymer}V_{polymer}$

The ratio of the volume of polymer compared to the volume of fabric is:

$V_{polymer} = \rho_{fabric}V_{fabric}/\rho_{polymer}$ or $V_{polymer} = (\rho_{fabric}/\rho_{polymer})V_{fabric}$

For the lower limit of the bulk density range of claim 1:

$V_{polymer} = (0.2/\rho_{polymer})V_{fabric}$.

For the polyester of the present invention ρ is approximately 1.38g/cm^3, while for the acrylonitrile of Kobayashi ρ is approximately 0.81g/cm^3, which is nearly half the density of polyester. Therefore, in order to achieve a fabric bulk density of 0.2g/cm^3, the volume of polyester would be about 15% of the fabric volume while acrylonitrile would be about 25% of the fabric volume. Given the significant difference in the volume of polymer required to prepare the different fabrics, it is clear that a teaching of an acrylonitrile fabric is not applicable to teaching a polyester fabric.

Moreover, there would be no motivation to combine Aranaga with Kobayashi given their divergent teachings. In addition, even if they were combined, there would be no expectation of success given that to compare acrylonitrile to polyester is the proverbial equivalent of comparing apples with oranges.

Since Kobayashi fails to disclose, teach, or suggest either a density of a non-woven polyester bicomponent fabric in the range of 0.20 to 0.40 g/cm^3 or a non-woven fabric in the configuration of a well-defined plane, the combination of Aranaga and Kobayashi fails to provide a *prima facie* case of obviousness.

Furthermore, Kobayashi specifically teaches away from the method of preparing a non-woven fabric provided by the present invention. The present invention achieves an increased bulk density of the fabric by providing constraining surfaces, an outer mechanical force, to the fabric. The goal of Kobayashi is to allow the fabric to increase in thickness and specifically states that no outer mechanical force should be applied. (Column 7, lines 57-59.) In effect, Kobayashi teaches away from the present invention. Although the fabric of Kobayashi includes "uniformity in the surface density and flatness" as pointed out by the Examiner at page 6, lines 2-3 of the final office action, this is clearly not the result of an external mechanical force.

The combination of Aranaga and Kobayashi fails to teach a polyester bicomponent fabric in a well-defined plane having a density of 0.2-0.4g/cm^3. Considering that the references are directed to different polymer fibers (polyester versus acrylonitrile), one of skill in the art would have neither the motivation to combine the references nor an expectation of success. Therefore, Applicant respectfully submits that the combination of Aranaga and Kobayashi fails to provide a *prima facie* case of obviousness. Reconsideration and withdrawal of the rejections under Section 103 are appropriate and respectfully requested.

In view of the remarks set forth above, reconsideration and withdrawal of the rejections are appropriate and respectfully requested. Applicant submits that the present claims are patentably distinct over the art and in allowable form. Early allowance is, therefore, solicited. If the Examiner has any questions regarding this response, the Examiner is invited to contact the undersigned attorney.

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Respectfully submitted,

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